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Study protocol for a hybrid effectiveness-implementation trial of the Building Better Caregivers online workshop for rural family/ friend caregivers of people living with dementia

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Abstract

Introduction: Dementia caregiving is complex and disproportionally burdens caregivers living in rural areas due to fewer resources and formal support systems. There is an immediate need to identify effective, scalable, and accessible online programs to support rural caregivers' well-being. *Building Better Caregivers* (BBC), a possible solution, is an asynchronous online 6-week, interactive, and skills-building workshop developed for caregivers of persons with dementia. This research aims to assess the effectiveness and implementation of the BBC workshop when delivered among rural dementia caregivers in the United States.

Methods: A hybrid effectiveness and implementation trial applying mixed methods will be conducted in collaboration with local, state, and national partnering organizations. Eligible participants live in a rural area of the United States, give care at least 10 h a week for a family member or friend with dementia, and have internet access. Evaluation is based on the RE-AIM framework. Effectiveness outcomes are assessed using a randomized control trial. Caregivers are randomly assigned to the BBC workshop (intervention) or attention control group. Implementation

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CRediT authorship contribution statement
Jasmine Santoyo-Olsson: Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration. **Kate Lorig:** Methodology, Investigation, Writing – review & editing. **Elizabeth Macias Romo:** Investigation, Writing – review & editing. **Maritza Luzanilla:** Investigation, Writing – review & editing. **Giselle Aguayo Ramirez:** Investigation, Writing – review & editing. **Jing Cheng:** Methodology, Formal analysis, Writing – review & editing. **Catherine Chesla:** Methodology, Investigation, Writing – review & editing. **Kenneth E. Covinsky:** Methodology, Writing – review & editing. **Leah Karliner:** Methodology, Writing – review & editing. **Dolores Gallagher Thompson:** Methodology, Writing – review & editing. **Nancy Fahrenwald:** Methodology, Writing – review & editing. **Veronica Yank:** Conceptualization, Methodology, Investigation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration, Funding acquisition.

Declaration of Competing Interest
All but one author declare no conflicts of interest. Kate Lorig is a partner in the Self-Management Resource Center (offers licensing and training for Building Better Caregivers) and receives royalties from Bull Publisher for books used in workshops.

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outcomes are assessed using surveys and debriefing interviews from partnering organizations and participants. The study protocol including the study design, methods of recruitment and assessment, and outcomes are described.

Conclusion: This is the first known study to evaluate both the effectiveness and implementation of a caregiver support intervention under real-world conditions in rural areas. If successful, this online workshop will be a practical and acceptable approach for promoting the health and well-being of geographically isolated rural dementia caregivers.

Keywords

Rural; Caregivers; Caregiver burden; Dementia; Depression; Self-management intervention; Internet-based intervention; Effectiveness; Implementation

1. Introduction

Informal caregivers of adults living with dementia face ongoing challenges [1–4]. Informal caregivers are family members or friends who provide support and home care for their care partners. Caregiving impacts caregiver health, emotional well-being, family responsibilities, relationships, finances, and career, which in turn may hinder their ability to maintain their caregiving role [5–8]. Dementia caregiving is particularly complex due to the frequent need to manage behavioral disturbances and provide constant supervision that allows for little respite [3,9]. Dementia caregivers experience high rates of depression, stress, and other adverse health outcomes [9–11], and they are more likely than caregivers of adults without dementia to report negative effects of caregiving [9].

Despite sizeable research on informal caregivers, less attention has focused on the experiences of rural caregivers [12,13]. According to United States (U.S.) Census data, 20% of the population lives in rural areas [14], and 18% of rural residents are 65 and older compared to less than 14% of urban residents [15]. One in 4 rural adults are caregivers, and nearly 10% provide care to someone with dementia [16]. Rural caregivers face unique challenges related to aging in place. Rural areas are characterized by lower rates of personal income, educational attainment, and health insurance coverage than urban areas [17]. On average, rural populations have less access to public transportation, social services, health care services, and higher speed or broadband internet services [12,18]. Moreover, rural caregivers are less likely to have access to support groups, home care or nursing agencies, and other paid help to assist with caretaking responsibilities [19]. Rural dementia caregivers feel the impacts of these challenges, reporting higher rates of ill health and financial distress from caregiving than urban counterparts [20]. Rural residents also report personal and community assets (e.g., resilience, local networks) that may be unique sources of strength [21,22]. Thus, there is a need for interventions that can reach and support rural dementia caregivers [13,23,24].

In systematic reviews, dementia caregiver self-management support interventions have been shown to improve caregiver well-being [25–27]. Many are resource intensive and more appropriate for urban settings where health professionals are more readily available [19]. Most support interventions are structured for one-on-one delivery through home visits, telephone calls, or counseling sessions by health professionals [28–31]. While some have been adapted for delivery by videoconferencing [32] or streaming [33,34], these adaptations require attendees to meet online at the same time or have broadband internet to stream videos. While broadband access has increased to 63% among U.S. rural adults they remain less likely than urban adults to have such access [35]. Therefore, an alternative and scalable delivery modality is needed to reach as many rural caregivers as possible. While rural dementia caregivers have expressed a desire for online programs [36], such support is seldom available.

The *Building Better Caregivers* (BBC) workshop is an asynchronous online peer-led group workshop that can be accessed with lower speed internet and is designed to boost self-care and caregiving skills [37]. Asynchronous delivery allows caregivers to use materials at home when they have time (day or night), to self-pace their learning, and to chat asynchronously with other caregivers through threaded discussion board conversations. While prior studies have demonstrated a positive impact on depression, stress, self-efficacy, and well-being [37–39], the workshop has not been evaluated in a randomized controlled trial (RCT). To accelerate the translation of efficacy evidence into practice, we designed a hybrid effectiveness and implementation study to simultaneously evaluate the impact of the BBC workshop on the well- being of rural dementia caregivers and to evaluate its future implementation potential in rural communities.

2. Methods

2.1. Study aims and objectives

The study aims to assess BBC effectiveness and real-world implementation when delivered in rural areas across the U.S. Objectives are to:

1. Determine the effectiveness of the BBC workshop for improving the well-being of rural informal caregivers of adults living with dementia.
2. Identify key strengths (facilitators) and weaknesses (barriers) of workshop implementation in real-world contexts.

2.2. Study design

This five-year study uses a hybrid effectiveness and implementation trial design. The hybrid design builds on implementation science methods and enables more rapid translation of the tested intervention (if effective) into real-world practice because it has an a priori dual focus on intervention effectiveness *and* implementation characteristics [40–43].

2.3. Partnership with organizations serving rural communities

We have engaged 20 organizations that serve rural regions as study partners – one national organization and 19 local- and state-level organizations in 17 states, including area agencies on aging, healthcare organizations, and other organizations with ties to older adults and caregivers (see Table 2 for name of organizations). Partnering organizations participate in twice annual webinars, listserve communications, and smaller group exchanges as described further in the implementation evaluation methods below. These activities support peer-to-peer networking, knowledge transfer, and problem solving. We leverage the expertise of partnering organizations to tailor outreach approaches and implementation processes to rural communities, which vary by geography, race/ethnicity, and other characteristics.

2.4. RE-AIM framework

We use the RE-AIM implementation framework to evaluate the implementation potential of BBC among rural caregivers in community settings [41,44]. The acronym represents the domains assessed by the framework – reach, effectiveness, adoption, implementation, and maintenance. The reach and effectiveness domains focus on the individual level – in this case, rural caregivers. The adoption domain focuses on the setting-level, in this case the partnering organizations. The implementation and maintenance domains encompass both individual (caregiver) and setting (organization) levels. As recommended, we use mixed methods for data collection and analysis [45]. We describe methods for the effectiveness RCT (E domain) first and then the R and AIM domains.

2.5. Effectiveness trial

The 12-month RCT will assess the effectiveness of the 6-week online BBC workshop in improving caregiver depressive symptoms and stress level. We hypothesize that depressive symptoms and stress level will be significantly improved in the intervention group versus control group. Main outcome analyses will be at 12 months. We assess outcomes at baseline, 1.5, 6, and 12 months (Fig. 1). Activities are conducted in English. The Institutional Review Board of the University of California San Francisco approved the study protocol (approval #18–25814).

2.5.1. Participants – Recruitment, inclusion criteria, and screening—Multiple recruitment approaches, such as flyers, postcards, social media, emails, radio, newspaper, presentations to organizations, and word of mouth are used by partnering organizations and study staff. Outreach materials invite interested caregivers to visit the study website (https://caregiverproject.ucsf.edu/) or toll-free telephone number to learn more and complete the screening survey. Members of the study team, representatives of partnering organizations, and expert advisors are from diverse backgrounds. They will inform the design (wording, images, delivery) of outreach efforts to make them welcoming, relevant, and reflective of diverse caregivers – including race/ethnicity, LGBTQ+ identity, relationship with care partner, age, and other characteristics.

2.5.2. Caregiver inclusion/exclusion criteria—Inclusion criteria are: age 18 and older, caring for a family member or friend with dementia; providing care 10 h or more per week defined broadly as giving help with dressing, meals, transportation, appointments, or similar support; ability to access the internet; reporting a stress level of 4 or more on a 10-point scale [46]; living in a rural, farming, or small town area of the U.S. (self-identify or zip code of residence is a Rural Urban Commuting Area Codes (RUCA) [47] defined rural area); and English proficiency.

Exclusion criteria are: current participation in a caregiver support program with similar content to BBC or providing an invalid email or mailing address.

2.5.3. Screening procedure—

Screening is done via a short online survey that asks about inclusion/ exclusion criteria and limited socio-demographic characteristics. Respondents who are not eligible are directed to a caregiver resource website. Respondents who are eligible receive an email directing them to the online study consent form and baseline survey.

2.5.4. Randomization—

Enrolled participants are randomized utilizing a flexible randomization ratio approach. This approach has been used in a prior self-management study to improve retention [48]. Randomization with ratios of 1:1, 2:1 or 3:1 to treatment and control are applied depending on the number of caregivers recruited into a cohort during a recruitment period (approximate 3-month period). For example, if 40 participants enroll within a given period a 3:1 randomization (30 to treatment versus 10 to control group) is applied. This approach shortens the wait time between study entry and treatment and control initiation. Approximately 27 participants are necessary to start a workshop.

2.5.5. Intervention group: Building Better Caregivers (BBC) workshop—

The BBC workshop is an online peer-led group workshop designed for caregivers of persons living with dementia or other form of cognitive impairment [37,38]. It is a Self-Management Resource Center workshop originally developed at Stanford University for the Veterans Administration [37,38] and is licensed for online delivery by Canary Health. The intervention is based on Self-Efficacy Theory [49] and designed to enhance participant self-management behaviors, dementia caregiving skills, and peer social support (Table 1). Workshop participants are asked to log on at least 2–3 times a week for 10 to 30 min per time. The workshop can be accessed with lower speed internet (e.g., no broadband) at any time of day. Participation does not require “real time” attendance or video-conferencing (e.g., Zoom).

Upon randomization, participants create screen names to protect their anonymity. Caregivers receive a book [50] by mail during the first week of the workshop to use during the workshop and keep afterwards. The book contains abbreviated information on topics covered in the workshop. Each week the workshop focuses on 2–3 new topics and tools for participants to learn and use (Table 1). Caregivers read about these topics and use related tools in their own private learning center. The workshop also uses frequent online conversations that occur on threaded discussion boards where participants can interact, help each other, and provide peer social support. Caregivers post about topics of the week, their questions and caregiving challenges, or other topics, and can respond to posts of others. All posts are visible for everyone in the workshop. Workshop participants receive training on how to contact workshop facilitators.

Workshops are guided by two trained peer co-facilitators (caregivers themselves). Facilitators receive rigorous training including how to address the needs and concerns of rural dementia caregivers, safety concerns such as when and how to activate safety protocols for participants who are at risk for self-harm or harm to others, and how to manage inappropriate post content (e.g., misinformation, abusive comments). Facilitators post prompts on discussion boards that correspond to topics of the week. Facilitators monitor all online interactions and postings daily and check in electronically with individual participants at least once weekly.

The study staff and physician monitor workshop quality, safety, and complete fidelity assessments of each workshop. If facilitators stray from the protocol, they receive immediate feedback and remedial training from a supervisor with advanced training. The supervisor meets weekly with facilitators to review workshop progress.

2.5.6. Control group—The modified attention control is similar to that used in REACH II [51] and occurs during the same 6-weeks as the workshop. After control participants complete the 12-month trial, they are also offered the workshop. An attention control group was selected because BBC has not been tested in an RCT. An attention control group provides participants with information and modest support; and may help with trial retention. Control group participants receive a mailed handbook [52] and two 15–30 min protocolized telephone calls from study staff. The phone call protocol guides staff on what to say and not say, and how to respond to typical caregiver concerns by guiding them to content within the handbook or publicly available resources. Control group components do not include self-management or peer social support activities. Early in the trial, fidelity will be assessed for 50% of calls per cohort until staff demonstrate mastery, and then will taper to a minimum of 20% of calls per cohort. If study staff stray from the protocol, they receive timely remedial training. Study staff are trained in participant safety protocols parallel to those for workshop participants.

2.5.7. Outcomes—Outcomes are assessed at baseline, 1.5, 6, and 12 months using caregiver self-administered online surveys that take approximately 20 min to complete. Primary and secondary outcomes are based on prior research and hypothesized intervention effects (Table 1). Caregivers receive $20 in remuneration for each completed survey.

2.5.7.1. Primary outcomes.: We use the Patient Health Questionnaire (PHQ-8) to assess caregiver depressive symptoms as the primary outcome [53]. The PHQ-8 is an eight-item scale that is validated for self- administration in both clinical and population samples, takes 1–5 min to complete, is responsive to change, and generates a score between 0 and 24 with a higher score indicating worse outcome [54–56]. We use a single item visual numeric stress scale to measure caregiver stress as the patient-centered co-primary outcome [46,57]. The score ranges from 0 to 10, with higher score indicating worse outcome.

2.5.7.2. Secondary outcomes.: Secondary caregiver outcomes are: general health, exercise behavior, health care utilization, social isolation, loneliness, self-efficacy for caregiving, caregiving burden, caregiving benefits, and positive aspects of caregiving [46,58–64] (see Table 1 for details on measures). Care partner outcomes are reported by the caregiver and include general health and health care utilization [46,58] (Table 1).

2.5.7.3. Covariates.: Caregivers are asked their age, education, race/ethnicity, sex, gender identity, sexual orientation, health conditions and disabilities. Caregivers also report on support services they utilize, caregiving hours, and impact of COVID on caregiving [65]. On behalf of their care partner, caregivers report on age, education, race/ethnicity, sex, everyday cognition [66], health conditions, support given for activities of daily living (ADLs) and instrumental ADLs, and services received (e.g., meal delivery, home health).

2.5.8. Data analysis plan—

We will estimate means and proportions, measures of variability, and confidence intervals of outcomes at baseline and 1.5, 6, and 12 months for participants overall and by group. We will determine whether baseline characteristics are independent of group assignment (randomization check) and attrition (attrition analysis). Outcome measures will be summarized with mean, standard deviation, and median by group and time (0, 1.5, 6, and 12 months). Given that participants enroll in a random manner without knowing what randomization ratio will be applied, we do not expect an effect of randomization ratio on treatment effect. However, outcome measures will be summarized by randomization ratio to assess potential effect of randomization ratio on treatment effect.

The primary hypothesis is that caregivers in the workshop group when compared to the control group will demonstrate lower depressive symptoms and lower stress levels at 12 months. Secondary hypotheses are that caregivers in the workshop group when compared to control group will demonstrate better self-rated health, more exercise behaviors, fewer hospitalizations, lower social isolation, lower loneliness, greater caregiving self-efficacy, lower caregiving burden, and greater caregiving benefits and positive aspects. Secondary hypotheses are that care partners of caregivers in the workshop group when compared to control group will have better general health and fewer hospitalizations. We will also assess these hypotheses at 6 months.

Our primary analyses will assess the intention-to-treat (ITT) effect of the intervention on depressive symptoms (PHQ-8 score) and stress levels at 12 months. Depending on the distributions of the outcomes we will use linear mixed effects models (LMM) or generalized linear mixed effects models (GLMM). The LMM or GLMM will use all available observations and will assume that data is missing at random conditional on observed data, which is a less restrictive assumption than assuming data is missing completely at random, which is the assumption in complete case analyses. Specifically, a LMM or GLMM will be used to evaluate the group difference over time in PHQ-8 score and stress level, with fixed effects for indicators of intervention group assignment and time, as well as the group-by-time interaction, and random effects for workshop and subjects to account for the correlation within workshop and subjects due to measurements over time. Group-by-time interaction effects will provide the estimated ITT effect of the intervention on PHQ-8 score and stress level over time, where the effects at 12 months will be our primary interests. If there are baseline covariates imbalanced between groups by chance, they will be included in the LMM to control for potential confounding. We expect that correlation within a region will be negligible but will include a random effect for region if it is not.

Secondary analyses will include supplementary analyses on the primary outcomes and analyses of secondary outcomes that are conceptually similar to models described above. Supplementary analyses on the primary outcomes will include assessing effects of randomization ratio on treatment effects, using potential outcome-based approaches to estimate intervention effects while accounting for noncompliance (e.g., complier average causal effect), mediation analyses to understand mechanisms/pathways of the intervention on PHQ-8 score and stress level via and around its effect on intermediate variables (e.g., self- efficacy), assessing moderation effects of baseline covariates on intervention-outcome relations, and sensitivity analyses with different approaches for addressing dropout and missing data (e.g., complete case analysis, multiple imputation, pattern-mixture model).

2.5.9. Sample size and power calculations—We aim to recruit 640 participants. The sample size and power calculation were powered using the more conservative primary outcome from a pilot study that included both PHQ-8 score and stress level [37]. Using the more conservative outcome, the PHQ-8 score effect size of 0.27 corresponds to 1.51 group difference assuming a common standard deviation of 5.6 [37]. The power calculation accounts for the flexible randomization ratio approach. Assuming that randomization with varied ratios will achieve a retention rate of 75% and in case the randomization ratio needs to be controlled for as a categorical variable in the analysis model, 480 (of 640) caregivers retained at trial completion will allow us to detect a partial correlation of 0.13 between the treatment and primary outcomes with a power of 0.82 at a significance level of 0.05 (two-sided).

2.6. Implementation trial

2.6.1. Reach—Reach is defined as the number and representativeness of participants who enroll contextualized by the target population [44]. As described in the RCT methods, study staff and partnering organizations apply multiple outreach approaches. We prospectively record date and region of outreach efforts, visits to the study website by potential participants, characteristics of caregivers who complete the screening survey (region, how they heard about trial), and characteristics of enrolled caregivers (Table 2). We determine the profile (number, socio- demographics) of caregivers in targeted rural regions based on Census data [67]. Using these data, we will perform descriptive analyses to determine whether enrolled caregivers are reflective of caregivers in the targeted regions and include caregivers the literature suggests are less often reached by caregiver interventions (e.g., men, persons from traditionally marginalized populations) [68,69]. Data are tracked and managed using a secure REDCap data system.

2.6.2. Adoption—Adoption is defined as characteristics of settings that decide to initiate the project versus those that do not [44]. Study staff log communications (emails, meetings) with each organization and ask them to complete brief online surveys. Data collected include details on why and how each organization adopts the intervention or decides not to, organization characteristics (regions served, services provided), profile of staff involved in the project (leaders, front-line personnel), and desire for adaptations of materials or workflows to assist with uptake within their organization and region. With this data, we will determine characteristics of organizations that successfully engage in the project versus those that originally express interest but do not begin.

2.6.3. Implementation—Implementation is defined at the individual level as caregiver use of the intervention. Outcomes explore the type and intensity of caregiver engagement with the workshop, extent to which they receive the workshop as intended, and potential explanations for both. The workshop platform records logins, sections visited, and activities performed each week. Participants who complete four or more of the six weekly sessions are considered to have completed the workshop based on prior research identifying four weeks as the effective dose to achieve workshop impact [70]. In the 1.5-month survey, caregivers answer implementation questions on how they accessed the workshop (laptop, smartphone, tablet), how easy or difficult it was to enter, navigate, and complete activities, and what aspects of it they used or did not use. We will perform descriptive analyses of platform- and survey-based data. In addition, approximately 60 intervention group caregivers from across Census regions (West, Midwest, South, Northeast) complete 30-min semi-structured debriefing interviews by telephone or video following their 12-month trial completion. They receive $30 in remuneration. Interviews are audio-recorded and transcribed. Implementation-specific questions ask what got in the way (barriers) or helped them (facilitators) participate, how and why they did/did not do particular activities, and suggestions for improvements. We will perform thematic analysis of interview transcripts [71,72] using Dedoose qualitative analysis software [73]. The coding team will apply deductive codes (derived from RE-AIM and caregiving literature), identify emergent codes, and meet for discussion. The process of independent coding followed by group discussion will repeat until no further codes or refinements to codes are identified and all members agree on the final codebook. Then the team will code transcripts, resolve discrepancies, and discuss and reach consensus on the qualitative findings of interview themes. Findings will characterize a spectrum of workshop experiences and reasons for better vs. worse uptake.

At the organization level implementation is defined as the extent to which partnering organizations complete activities required for project launch (in the first six months) – and why/why not they do so. The research team uses surveys and facilitated webinar discussions to gather data. The 1-month post project launch survey asks whether partnering organizations are performing specific types of outreach and referral activities (e.g., with caregivers or close contacts) and what types of materials they use (e.g., flyers, social media). Study staff also collect data during 90-min webinars with partnering organizations. Webinars occur twice during the first six months of project launch (implementation phase) and then twice annually thereafter (maintenance phase). Implementation discussion questions focus on what is going well/not going well, suggestions for improvements, and how the COVID-19 pandemic has/has not impacted project activities. Webinars are audio- recorded and transcribed. Study staff will perform descriptive analyses of survey data and thematic analysis of webinar discussion data using methods similar to those described for caregiver data. We will contextualize and integrate organization-level results with caregiver-level findings.

2.6.4. Maintenance—Maintenance is defined as the extent to which intervention-related behaviors are maintained. At the caregiver level, 6- and 12-month survey questions ask what learned skills or behaviors caregivers have continued to use (e.g., action planning, managing stress). In debriefing interviews, maintenance questions ask how the workshop impacted them, what aspects have had greatest/least impact and why, and how they are using what they learned in their lives now.

At the organization level, maintenance is defined as continued performance of project activities beyond the first six months. Every six months prior to webinars, organizations complete brief surveys about outreach and referral activities. Then during webinars they discuss survey responses – including insights on effective/ineffective approaches in their areas, challenges encountered (e.g., COVID constraints), and how they are able/not able to address challenges (e.g., meet by zoom). For organizations that discontinue the project, study staff elicit input on the context and reasons (e.g., change in priorities, staff turnover). We will analyze survey, interview, and webinar data as described previously.

3. Status to date

The original plan was for partnering organizations to assist with recruitment. However, during the COVID-19 pandemic many organizations have been unable to devote resources to recruitment despite remaining engaged (e.g., attending webinars). Our study staff has filled the gap by performing additional recruitment activities. We have contacted 1660 service providers, businesses, and other groups in 50 states. These include area agencies on aging, senior centers, respite centers, faith-based organizations, recreation centers, rural newspapers and radio stations, and other local organizations with ties to rural caregivers, older adults, and communities. Study enrollment is ongoing and currently includes 278 caregivers from all U.S. Census regions – 33% from the West, 26% Midwest, 27% South, and 15% Northeast.

4. Conclusions

This hybrid effectiveness and implementation trial will enroll participants through 2022. Findings will determine the effectiveness and implementation characteristics of the *Building Better Caregivers* online self-management and skills-building workshop for rural caregivers of family members or friends living with dementia. If the workshop is shown to be effective, we will have the implementation findings and network of partnering organizations necessary to guide dissemination efforts within large rural regions of the U.S.

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Data availability

No data was used for the research described in the article.

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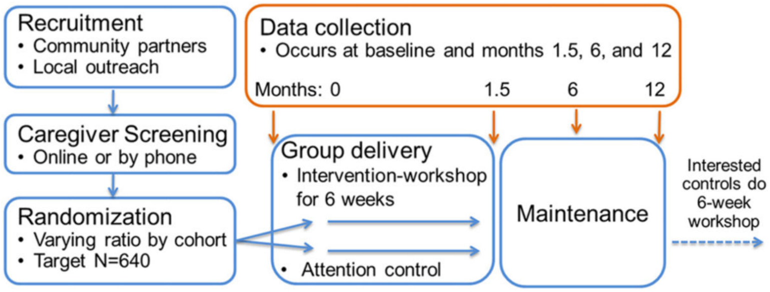

Fig. 1.

RCT participant flow & data collection schedule.

Table 1

Building Better Caregivers workshop topics and trial outcome measures.

Workshop topics[a]	**Outcome measures**
Self-management Managing difficult emotions Managing stress Healthy physical activity and eating Getting a good night's sleep	**Caregiver** • PHQ-8 depression scale[c] • Visual numeric stress scale[d] • SF-1 general health question[e] • Exercise behaviors[f] • Health care utilization measures[g]
Social support Workshop interactions with peers Communicating with family/friends Asking for help	**Caregiver** • Lubben social isolation scale[h] • UCLA loneliness scale[j]
Dementia caregiving Action planning and problem solving Managing difficult care partner behaviors	**Caregiver** • Caregiver Self-Efficacy short scale[j] • Zarit burden interview short scale[k] • Caregiving benefits & positive aspects scales[l]
Safety concerns Managing medications Working with medical professionals, systems Planning for the future	**Care partner**[b] • SF-1 general health question[e] • Health care utilization measures[g]

[a] These are the main workshop topics; for more detailed information refer to [37,38].

[b] Caregiver reported outcomes on behalf of care partner.

[c] Caregiver *depression* is a primary outcome and is assessed using the 8-item Patient Health Questionnaire (PHQ-8) [53].

[d] Caregiver *stress* is a co-primary outcome and is assessed using a single item visual numeric stress scale [43].

[e] Caregiver and care partner *overall health* is assessed using the SF-1 single-item measure of overall health [58].

[f] Caregiver *exercise behaviors* is assessed using a 6-item scale used in the Chronic Disease Self-Management study [43].

[g] Caregiver and care partner *health care services utilization* is assessed using a modified measure from the Chronic Disease Self-Management study [43].

[h] Caregiver *social isolation* is assessed using the 6-item Lubben Social isolation scale [59].

[i] Caregiver *loneliness* is assessed using the 3-item UCLA loneliness scale [60].

[j] Caregiver *self-efficacy* is assessed using the 8-item Caregiver Self-Efficacy Scale (CSES-8) [61].

[k] Caregiver *burden* is assessed with the 12-item short form of the Zarit Burden Inventory [62].

[l] Caregiving *benefits and positive aspects* are assessed using two scales: a 4-item scale from the Health and Retirement Study [63] and the 9-item Positive Aspects of Caregiving Scale [64].

Table 2

RE-AIM framework domains, data collection approaches, and outcomes.

RE-AIM domain	Inputs	Data collection and timeframe	Outcomes
Reach	Caregivers	Website analytics • longitudinal Surveys screening baseline	Study website visits by local area, state, and region How heard about trial; characteristics of who enrolled or not; number of screened and enrolled
Effectiveness[a]	Caregivers	Surveys • baseline • 1.5 months • 6 months • 12 months	RCT outcomes (Table 1)
Adoption	Organizations[b]	Communication between study staff and organizations • emails • meeting notes Surveys	Profile and characteristics; level of interest; profile of staff involved; desired materials and workflows; adoption rate; reasons for adopting or not
Implementation	Caregivers	Workshop platform analytics • longitudinal per workshop	Logins; sections visited; activities performed each week; resource materials accessed; number of workshop sessions completed
		Survey 1.5 months	Device used to access workshop; ease of logging into workshop, navigating, and completing activities; workshop components used or not
		Debriefing interview • after RCT completion	Barriers and facilitators of workshop participation; why certain activities were selected over others; activities liked most/ least and why; suggestions for improvements
	Study staff	Fidelity assessment • twice per workshop	Extent to which workshop is delivered as intended
	Organizations	Survey • 1 month post project launch	Outreach and referral activities completed; reason for doing activities or not; types of outreach materials used
		Webinar discussion notes • 1 month post project launch • 4 months post project launch	Barriers/facilitators to project launch in organizations and regions; suggestions for improvements; how COVID-19 pandemic has/has not impacted project activities
Maintenance	Caregivers	Surveys 6 months 12 months	Skills/tools that continue to use
		Debriefing interview • after RCT completion	Impact of workshop on self, caregiving, care partner; appropriateness for rural caregivers; reasons for recommending or not the workshop to others
	Organizations	Surveys • every 6 months	Project outreach and referral activities maintained
		Webinar discussion notes • every 6 months	Barriers/facilitators to project outreach and referral activities maintenance; how address challenges or not
		Communication between study staff and organizations • emails • meeting notes	Organizations that have discontinued project and reasons

RE-AIM = reach, effectiveness, adoption, implementation, and maintenance.

RCT = randomized control trial.

[a] The RE-AIM framework domain of “E” (“effectiveness”) is addressed primarily by the RCT on workshop intervention effectiveness.

[b] Humboldt Independent Practice Association; United Indian Health Services’ Potawot Health Village; Elder Options; Eastern Idaho Community Action Partnership; CICOA Aging and In-Home Solutions; Maine Health Partnership for Healthy Aging; Maryland Living Well Center of Excellence; Elder Services of the Merrimack Valley, Inc.; Centralina Area Agency on Aging; North Carolina Department of Health and Human Services Division of Aging and Adult Services; Center for Rural Community Health, Bassett Research Institute; North Central Texas Area Agency

on Aging; Area Agency on Aging of North Texas; Area Agency on Aging of the Panhandle; Area Agency on Aging of Tarrant County; Texas A&M Center for Population Health and Aging; AARP South Dakota; Office of Rural Health in South Dakota; Sanford Health; National Council on Aging.